GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mechanics II, PG_00055119		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Oleksii Nosko	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	0.0	60

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	8.0	82.0	150

Subject objectives

To acquaint students with the basics of solid state mechanics, including: kinematics and dynamics. Developing the ability to solve practical problems covering the issues of kinematics and dynamics of a point, a rigid body in its translational, rotational and plane motion.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U06	Can properly interpret the results of research obtained on the basis of numerical calculations and computer simulations of developed mathematical models.	[SU1] Assessment of task fulfilment
K6_U01	Can obtain information from various sources of professional literature, as well as use and critically evaluate them.	[SU2] Assessment of ability to analyse information
K6_W04	Student is able to solve practical problems covering the issues of statics, kinematics and dynamics of a material point as well as a rigid body. Has a general understanding of modeling and can go from a real object through a physical model to a mathematical model. Has a basic knowledge of vibrations of the systems with one and many degrees of freedom.	[SW1] Assessment of factual knowledge

Subject contents	LECTURES: Introduction: Organization of classes and literature on the subject. Kinematics: Basic concepts of point kinematics: location, velocity and acceleration, motion equations. Description of point motion in alternative coordinates: rectangular, normal, polar. Tangent and normal components of acceleration . Particular cases of point kinematics. Kinematics of the solid. Basic concepts. The position of the solid, angular velocity and acceleration of the solid, and velocity and acceleration of point that belongs to the solid. Special cases of motion of solid: translational motion, rotational motion, planar motion. Relative motion. Coriolis acceleration. Dynamics: The notion the basic dynamics of material point. The special cases of equations of movement. Principle of dynamics. Work of force. Power of forces. The principle of energy and the work. Potential. Principle of behavior of mechanical energy. Differential figure of principle of energy and the work. Dynamics of arrangement of material points. The work of forces acting on arrangement of material points. The notion the basic dynamics of rigid body. The geometry of rigid bodies: mass moments of inertia. Steiners statement. Differential equations of translation, rotation and uniplanar motion of rigid body. The momentum, momentum of momentum and kinetic energy of rigid body in translation, rotation and uniplanar motion. Vibrations of mechanical systems. EXERCISES : Vector calculations. Point kinematics: differentiation and integration of motion equations. Kinematics of the points system. The kinematics of the solid, the temporal center of rotation. Arrangement and the solving the dynamic equations of movement of material point. d"Alembert principle. The principle of speed and the impulse as well as the principle the moment of momentum. Use of principle of energy and the work as well as the behaviour of energy. Calculation moments of inertia of rigid body. Use of dynamic equations of movement for translation, rotation and uniplanar motion of rigid body. The use of d"Alemberts principle, reactions of bearings. Vibrations of mechanical systems.
Prerequisites and co-requisites	Knowledge of physics and mathematics at an academic level, especially: geometry and trigonometry, differential calculus, vector and matrix calculus.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Tutorials	56.0%	50.0%
Lectures	56.0%	50.0%

Recommended reading	Basic literature	1. Hibbeler R.C. Engineering Mechanics. STATICS, PEARSON 2017 2. Hibbeler R.C. Engineering Mechanics. DYNAMICS, PEARSON 2017 3. Wittbrodt E., Sawiak S.: Mechanika ogólna. Teoria i zadania. Wyd. PG, Gdańsk 2014
	Supplementary literature	1. Hendzel Z., Żylski W.: General Mechanics. Statics, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2016, 2. Hendzel Z., Żylski W.: General Mechanics. Kinematics, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2016, 3. 1.Hendzel Z., Żylski W.: General Mechanics. Dynamics, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2016, 4. Leyko J.: Mechanika ogólna, t. 1 i 2, PWN, Warszawa 2004, 5. Osiński Z.: Mechanika ogólna, PWN, Warszawa 2000, 6. Nizioł J.: Metodyka rozwiązywania zadań z mechaniki. WNT, Warszawa 2002, 7. Sawiak S., Wittbrodt E.: Mechanika. Wybrane zagadnienia. Teoria i zadania. Wyd. PG, Gdańsk 2007.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	